

Consideration on Directions of Nuclear Security in Republic of Korea

Jae Kwang Kim, Moon Sung Koh, Woo Jin Kim
Korea Institute of Nuclear Nonproliferation And Control (KINAC)
Yu-sung dae ro 1534, Yu-sung gu, Daejeon, KOREA, 305-348,
jkwang@kinac.re.kr

1. Backgrounds

The Seoul Nuclear Security Summit in March 2012 culminated in success with the Seoul communiqué-an announcement to more strengthened nuclear security. International Physical Protection Advisory Service (IPPAS) mission was officially requested to IAEA by Republic of Korea (ROK). IPPAS mission have serviced nuclear security system of member states to provide best practices, recommendations and suggestions in nuclear security.

Following up the Seoul communiqué, the government has been making significant efforts to improve the national nuclear security regime.

This paper suggests consideration on future direction of the nuclear security regime in ROK .

2. Status of nuclear security in Korea

2.1. Regulatory Frame work

Korea Institute of Nuclear non-proliferation and Control (KINAC) has been actively participating in international efforts to strengthen the regime of nuclear security. The sole government body of the Nuclear Safety and Security Commission (NSSC) was launched in October 2011 to enhance independently regulatory system.

On December 2011, two international conventions-ICSANT(International Convention for Suppression of Acts of Nuclear Terrorism) and the amendment to the CPPNM(Convention on Physical Protection of Nuclear Material)-were ratified by the National Assembly in December of 2011.

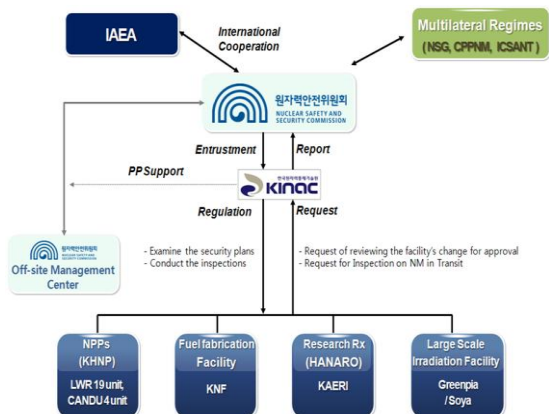


Fig.1.Regulatory framework diagram

Figure 1 shows an overall structure for the nuclear security regulatory framework in the ROK. The NSSC has been authorized to supervise the nuclear security and it entrusted KINAC to inspect the security systems and examine the security the security plans at nuclear facilities.

Currently there are four nuclear facilities in the ROK which consist of nuclear power plants, fuel fabrication facilities, research reactor facilities, and large scale irradiation facilities. As a total of 18 nuclear licensees in the ROK have been operating with the security plans approved by the NSSC.

2.2. Nuclear Security Regulation

Consistent with the IAEA's INFCIRC225/rev4, The Act for Physical Protection & Radiological Emergency (APPRE) had been taken into force in June of 2004 in order to establish a more concrete national physical protection system. Based on the APPRE, Korean nuclear facilities have been regulated by competent authorities such as the NSSC and KINAC. Major regulations include (referred as Table1):

- 1) Roles and responsibilities in the security regime that the NSSC and licensee must comply with
- 2) Security plans to be approved and inspections for the security system by the NSSC
- 3) Threat assessment for development of the DBT to be performed every 3 year
- 4) Classification of nuclear material, commensurate with INFCIRC 225 documentation
- 5) Physical protection requirements against unauthorized removal and sabotage also are specified based in INFCIRC/225/rev4

Type		Description
Review		Reviewing documents containing security plans and physical security section in Safety Analysis Report (SAR).
I N S P E C T I O N	Initial	Performed right before the first fresh fuel is introduced into a newly constructed facility
	Periodic	Conducted every 2 year
	Special	When security related accident occurred
	Transport	Checked on whether nuclear material are well protected during transport

Table.1. Regulation table according to the legislation

3. Directions for nuclear security in Korea

3.1 Security and Safety Interfaces (SSI)

Both nuclear security and safety measures ultimately share the common aim of protecting people, property and the environment from the effect of radiation. In order to achieve this goal, both measures have to be mutually supportive of each other in institutional, regulatory and operational aspects (referred as Table2).

Classification ^{a)}	Improvement topics ^{b)}	Cooperation Methods ^{c)}
Institutional Aspect ^{d)}	Establishment of Regulation and Guidelines ^{e)}	- Legal and institutional infrastructure ^{f)} - Implementing guidance (Criteria, Process) ^{g)}
	Configuration of SSI Practice Committee ^{h)}	- SSI practice committee comprised of both experts ⁱ⁾ - SSI promotion plan and management ^{j)}
Regulatory Aspect ^{k)}	SAR (Safety Analysis Report) Interface ^{l)}	- Harmonization of SAR examination (13.6 part) ^{m)} - Licensing integrated examination procedure ⁿ⁾
	Vital Area Identification ^{o)}	- Identification of URC and HRC considering SSI against sabotage ^{p)} - Development of VAI methodology using PSA (Probabilistic Safety Analysis) ^{q)}
	Cyber Security ^{r)}	- Legal and institutional infrastructure ^{s)} - Integrated procedure for examination and inspection ^{t)}
	Interface between contingency and emergency response ^{u)}	- Integrated scenario for contingency and emergency ^{v)} - Integrated manual and framework considering SSI ^{w)}
	Invigoration of SaFeTy-Security cooperation in NSSC Regional office ^{x)}	- Integrated inspection for safety and security ^{y)} - Working group comprised by licensees and regulators ^{z)}
	SSI Regulatory Procedures ^{aa)}	- Integrated regulation procedure for whole nuclear cycle ^{ab)}
Operational Aspect ^{ac)}	Configuration of the Integrated Organization for contingency and Emergency ^{ad)}	- Control tower organization against natural and artificial events ^{ae)} - Joint exercise between contingency and emergency ^{af)}
	Safety and Security by Design ^{ag)}	- Integrated process and guideline for NPP design ^{ah)}

Table.2. SSI aspects

3.2 Performance based regulation

Current nuclear security systems have been assessed on an item-by-item testing system. Regulators test each item with regard to their detection and/or delay systems-based on criteria approved by KINAC's requirement committee. When it comes to performance based regulation, all each items of a security system should be assessed systematically based on a sort of performance requirements in national regulatory regime. KINAC has been making efforts in developing such performance based requirements which could be applied to regulation.

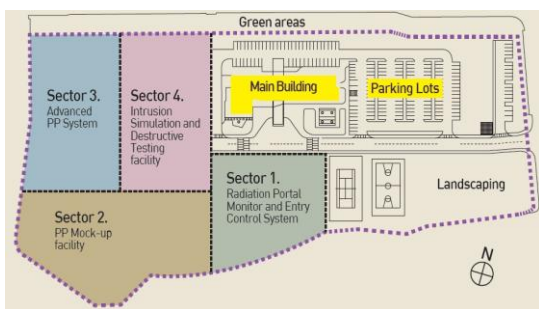


Fig.2. A Physical Protection Test Bed Design

Also performance based regulation requires a performance testing which is a kind of testing of a security system to determine whether or not the system is implemented as designed. The performance testing can be conducted through a certain form of threat scenario developed by design basis threat.

A conceptual design of security test bed as shown in Fig. 2 can be utilized in order to develop performance based requirements in national regulatory regime.

4. Concluding remarks

During the Nuclear Security Summit, future nuclear security related issues were considered. SSI is a key issue in nuclear security and should be defined the scope and contents between security and safety through a cooperative group consisting of security & safety policy makers, experts and regulators. Safety and security measures should be defined in institutional, regulatory and operational aspects.

Performance based regulation is also considered as another key issue with regard to the future direction of nuclear security. Existing nuclear security systems designed by legally proclaimed threat could be effectively evaluated and assessed by performance based requirements gained from a performance testing. This kind of testing can be performed in a KINAC security test bed which is now under construction and scheduled to be operational at the end of this year.

Acknowledgement

This work has been carried out under the nuclear research and development program supported by NSSC.

REFERENCES

- [1]Nuclear security recommendations on physical protection of nuclear material and nuclear facilities (also being INFCIRC/225 rev5), IAEA Nuclear Security series No. 13.
- [2]Guidance and considerations for the implementation of INFCIRC/225/Rev.4, The Physical Protection of nuclear material and nuclear facilities. May 2000.
- [3]Introduction of direction for amending on the INFCIRC225/rev. KNS jeju Oct 21-22, 2010.
- [4]Report on the regional workshop and nuclear material accounting & control training course(Beijing, China, 2011.09.06-09.23, KINAC/OT-21/2011.
- [5]Korean Nuclear Security Regulation and its Future Direction. J.K.Kim, KNS workshop Gwang-ju May 2013.
- [6]A Study on the Integrated Approach to Nuclear Safety and Security Interface in the ROK, M.S.Koh etc, July, 2013 Austria IAEA Nuclear security conference,